

Claims:

1. An electrical machine comprising:
 - a rotor secured to a shaft with an axis of rotation,
 - one or more magnets or means for producing a magnetic field,
 - a stator with air gap(s) formed between the rotor and the stator, and
 - one or more current windings or coils wound on and surrounding pole legs or pole cores, said pole legs or pole cores providing part(s) of one or more magnetic flux paths.
2. An electrical machine according to claim 1, wherein the machine comprises a plurality of pole cores or pole legs with windings or coils, and wherein separate pole cores or pole legs have corresponding separate coils or set of windings surrounding said pole cores or pole legs.
3. An electrical machine according to claim 1 or 2, wherein the rotor is arranged so that at least part of the rotor is substantially perpendicular to the axis of rotation
4. An electrical machine according to any one of the claims 1-2, wherein the magnets or means for producing a magnetic field are arranged in the rotor, and the pole legs or pole cores are arranged in the stator.
5. An electrical machine according to claim 3 or 4, wherein at least a portion of one or more of the pole cores is arranged at an angle to the axis of rotation, said angle being equal to or greater than 0 degrees and below 90 degrees.
6. An electrical machine according to claim 5, wherein the angle is equal to or below 45 degrees.

7. An electrical machine according to claim 5, wherein the angle is equal to or below 30 degrees.
8. An electrical machine according to any one of the preceding claims, wherein at least a portion of one or more of the pole cores is substantially parallel to the axis of rotation.
9. An electrical machine according to claim 8, wherein one or more windings or coils have their axis substantially parallel to the axis of rotation.
10. An electrical machine according to any one of the claims 1-8, wherein one or more pole cores have a portion arranged substantially perpendicular to the axis of rotation of the shaft.
11. An electrical machine according to claim 10, wherein one or more windings or coils have their axis substantially perpendicular to the axis of rotation.
12. An electrical machine according to any one of the preceding claims, wherein the rotor is circular.
13. An electrical machine according to any one of the preceding claims, wherein a magnetic flux path includes flux paths through two pole cores.
14. An electrical machine according to any one of the claims 1-12, wherein a magnetic flux path includes a flux path through a pole core and the rotor shaft.
15. An electrical machine according to claim 14, wherein two substantially oppositely arranged rotors are arranged on said shaft.
16. An electrical machine according to any one of the claims 1-13, wherein the stator further comprises a mag-

netic conductive end plate connected to said pole legs or cores.

17. An electrical machine according to claim 16, wherein
5 the end plate is arranged substantially parallel and opposite to the rotor.

18. An electrical machine according to any one of the
claims 1-13 or 16 or 17, wherein the number of pole cores
10 equals the number of magnets or means for producing a magnetic field.

19. An electrical machine according to any one of the
preceding claims, wherein the magnets or means for pro-
15 ducing a magnetic field are located radially and equidistantly in the rotor.

20. An electrical machine according to any one of the
preceding claims, wherein the magnets or means for pro-
20 ducing a magnetic field are located on one side of the rotor facing ends of the pole cores.

21. An electrical machine according to any one of the
claims 1-19, wherein the magnets or means for producing a
25 magnetic field are located on the outer periphery of the rotor.

22. An electrical machine according to claim 19, wherein
pole shoes are arranged between the magnets or means for
30 producing a magnetic field.

23. An electrical machine according to any one of the
preceding claims, wherein magnets or means for producing
a magnetic field are arranged on the rotor to fit sub-
35 stantially into a V-shape.

24. An electrical machine according to claim 23, wherein the magnets or the means for producing a magnetic field are arranged in pairs to obtain said V-shape.
- 5 25. An electrical machine according to claim 1 or 2, wherein the magnets or means for producing a magnetic field are arranged in the stator, and the pole legs or pole cores are arranged in the rotor.
- 10 26. An electrical machine according to claim 25, wherein the pole cores are arranged in the rotor so that at least a part of the pole cores is substantially perpendicular to the axis of rotation.
- 15 27. An electrical machine according to claim 25, wherein the pole cores are arranged in the rotor so that at least a part of the pole cores is at an angle to the axis of rotation, said angle being less than 90 degrees.
- 20 28. An electrical machine according to any one of the claims 25-27, wherein the magnets or means for producing a magnetic field are located in the stator facing ends of the pole cores.
- 25 29. An electrical machine according to any one of the claims 25-28, wherein the magnets or means for producing a magnetic field are arranged in the stator to fit substantially into a V-shape.
- 30 30. An electrical machine according to any one of the preceding claims, wherein the machine is a synchronous one phase machine.
- 35 31. An electrical machine according to any one of the preceding claims, wherein the machine comprises a plurality of magnets or means to be magnetized, said plurality being arranged in pairs having poles of similar polarity facing each other.

32. An electrical machine according to any one of the preceding claims, wherein the magnets are permanent magnets.

5

33. An electrical machine according to any one of the claims 1-31, wherein the means for producing a magnetic field are electromagnets.

10

34. An electrical machine according to any one of the preceding claims, wherein a winding or coil is formed by a flat concentrated coil.

15

35. An electrical machine according to any one of the preceding claims, wherein the pole cores are assembled of a magnetic conducting material.

20

36. An electrical machine according to claim 35, wherein the magnetic conducting material is a field oriented soft magnetic lamination.

25

37. An electrical machine according to any one of the preceding claims, wherein the machine is a generator which may be provided with a mechanical force/power via said shaft to generate an electrical power via said windings.

30

38. An electrical machine according to any one of the claims 1-36, wherein the machine is a motor, which may be provided with power from an electrical source via said windings to generate a mechanical force/power via said shaft.

35

39. An electrical machine according to claim 37, wherein said machine is used in a wind turbine.

40. A multiphase machine, wherein a number of phases is obtained by arranging a corresponding number of one phase

machines according to any one of the claims 30-39 in series.

41. An electrical machine according to claim 23,
5 wherein the magnets or means for producing a magnetic field are arranged on the rotor to fit substantially into two or more V-shapes.

42. An electrical machine according to claim 41,
10 wherein each V-shape comprises a pair of magnets or means for producing a magnetic field.

43. An electrical machine according to claim 29,
15 wherein the magnets or means for producing a magnetic field are arranged on the stator to fit substantially into two or more V-shapes.

44. An electrical machine according to claim 4, or
according to claim 4 and any of the claims 8, 9 or 13,
20 wherein the pole legs or pole cores are formed by U-shaped elements, said elements being arranged in the stator so that one pole leg is formed by two adjacent legs of two U-shaped elements.

25 45. An electrical machine according to claim 44, wherein the pole legs or pole cores are made of a magnetic conducting material, and wherein the pole legs are arranged on a stator plate made of a material have a low magnetic conductivity.

30 46. An electrical machine according to any of the claims 4, 44 or 45, or according to claim 4 and any of the claims 8, 9 and 13, wherein the width of a pole leg or pole core is substantially equal to the distance
35 between two successive pole legs.

47. An electrical machine according to claim 22 and any of the claims 4, 44, 45 or 46, wherein the width of a

pole shoe at the outer periphery of the rotor is substantially equal to the width of a pole core or pole leg oppositely arranged in the stator.

- 5 48. An electrical machine according to any of the claims 4, 44, 45, 46 or 47, wherein a first stator is arranged opposite to and facing a first side of the rotor, and a second stator is arranged opposite to and facing the other side of the rotor.

10